

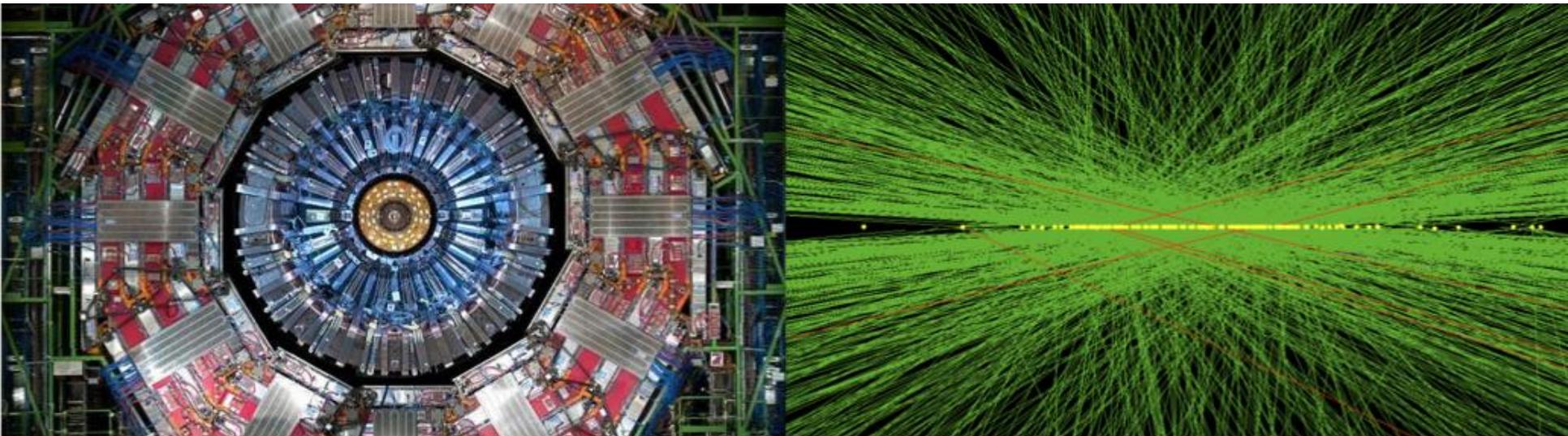


B01: Introduction to the Management Breakout Session

Vaia Papadimitriou, Deputy Project Manager

CD-1 Review

October 23, 2019





Outline

- Project Management breakout agenda
- Biographical Sketch
- International CMS Organization and U.S. Project Organization
- Requirements, Interfaces
- Response to Project Management recommendations from previous Reviews
 - Recommendations from the June 2018 IPR
 - Recommendations from the March 2019 pre-CD-1 Director's Review
- Procurement Status
- Summary

This presentation will address charge questions #2, #4, #5, #7 and #8



PM Breakout Agenda

Wednesday, 23 October 2019

Conveners: Dr. Vaia Papadimitriou (Fermilab), Steve Nahn

Location: Fermilab (Comitium (WH2SE))

08:00 **B01: Introduction 30'**

Speaker: Dr. Vaia Papadimitriou (Fermilab)

Material: [Slides](#) 

08:30 **B02: ES&H Overview 30'**

Speaker: Mr. Tj Sarlina (ESHQ Section)

Material: [Slides](#) 

09:00 **B03: Quality Assurance Implementation 40'**

Speakers: Carol Wilkinson, Dr. Carol Wilkinson (US CMS), Mr. Tj Sarlina (ESHQ Section)

Material: [Slides](#) 

09:40 **coffee break 20'**

10:00 **B04: DOE O 413.3B documentation review and process 25'**

Speaker: Dr. Vaia Papadimitriou (Fermilab)

Material: [Slides](#) 

10:25 **B05: Summary and Path Forward 30'**

Speaker: Steve Nahn (Fermilab)

Material: [Slides](#) 

10:55 **Time for Q&A 25'**



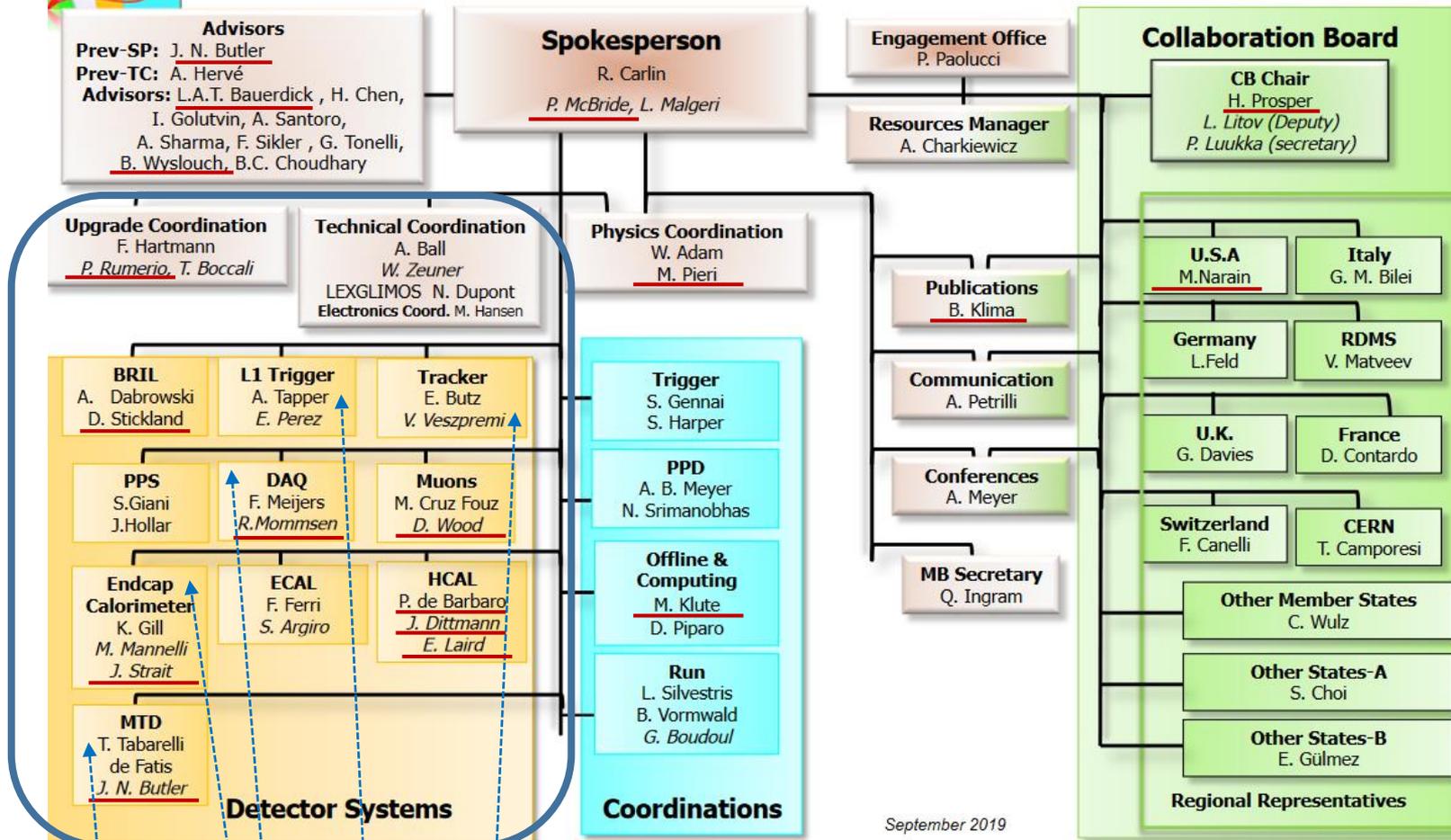
Biographical Sketch

Charge #5

- **Senior Scientist** at Fermilab since August 2003 (Particle Physics and Accelerator Divisions).
- U.S. CMS HL-LHC Upgrade **Deputy Project Manager** since July 2018.
- LBNE/LBNF Beamline (~\$200M) **Project Manager** for 8.5 years (2009-2018).
- **Assistant/Associate Division Head** of Accelerator Division for 3/8.5 years (2006-2018).
- **Professor of Physics** for 11 years at TTU, followed by 3 years as Adjunct Professor (1994-2008). PI/co-PI of successful DoE research proposals. Reviewer of scientific proposals for past 19 years.
- **34 years of experience** in the design, construction, operation, data/physics analysis and management of **particle physics experiments and of accelerators/beamlines** (E731-Kaon, CDF, CDF-II, Fermilab Accelerator Complex, LBNE/LBNF/DUNE, CMS).
- **Certificates** from Booth School of Business on **management and leadership training**.
- B. Sc., M. Sc., and PhD in **Physics**; L. M. Lederman Fellow at FNAL.



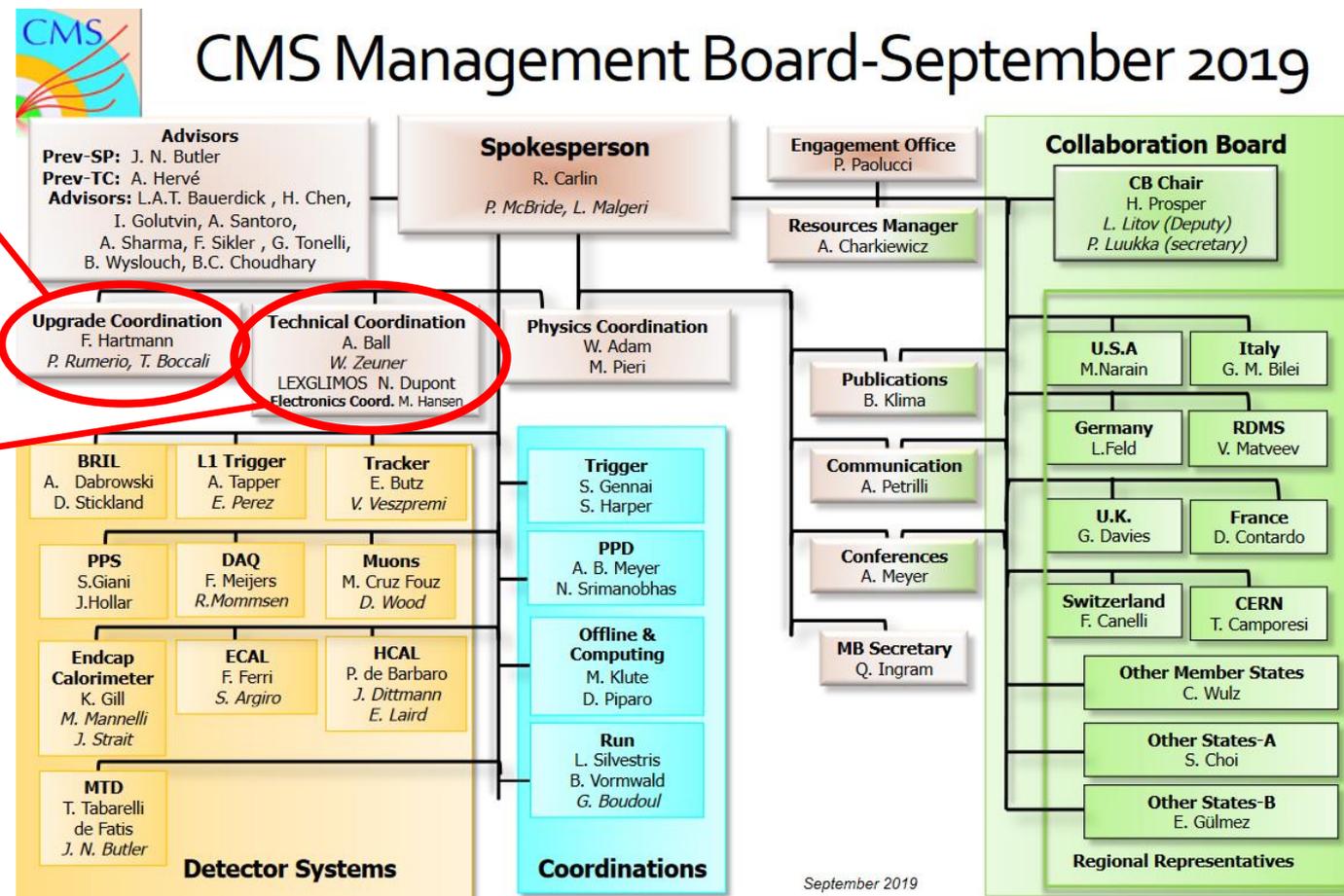
CMS Management Board-September 2019



HL-LHC (Phase-2) CMS Detector Upgrade resides here

— U.S. Participation

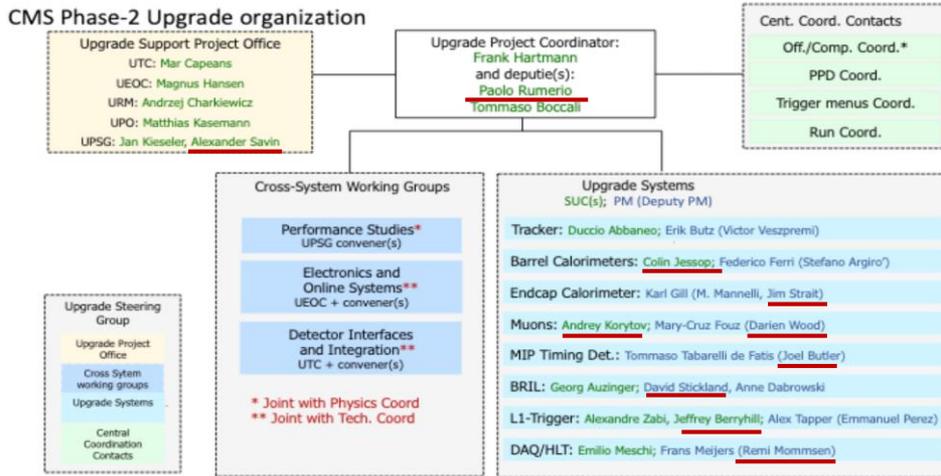
- CMS UC is responsible for scientific/technical requirements
 - Delegated to subdetector PMs and SUCs
- CMS TC is responsible for Safety/QA aspects of technical & programmatic requirements
 - Delegated to subdetector PMs and SUCs for implementation for non-safety reqs.
 - TC enforces through reviews
 - Formally delegated to LEXGLIMOS* (CERN safety professional) for safety reqs.



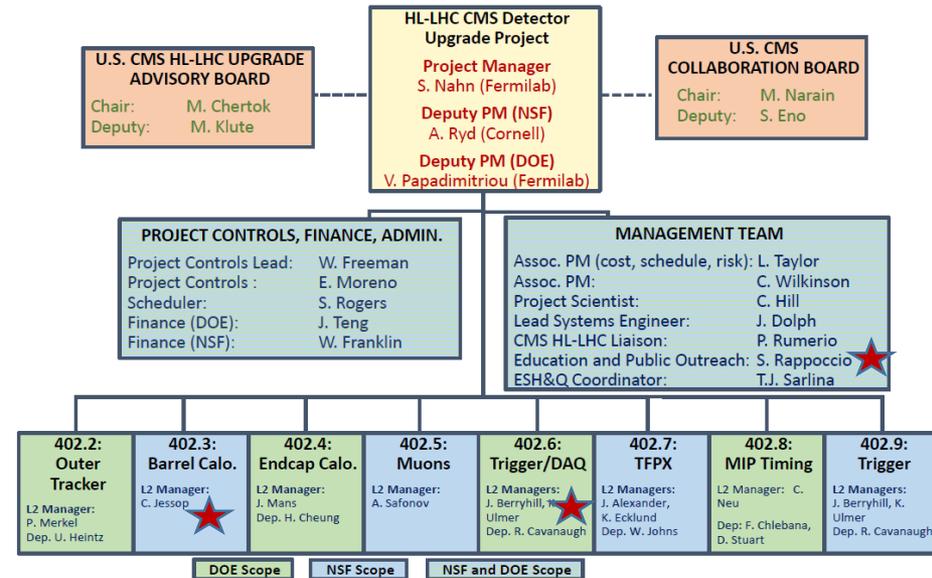
UC = Upgrade Coordinator
 SUC = System Upgrade Coordinator
 TC = Technical Coordinator

*Large EXperiments Group
 Leader In Matters Of Safety

Phase-2 CMS Detector Upgrade Organization



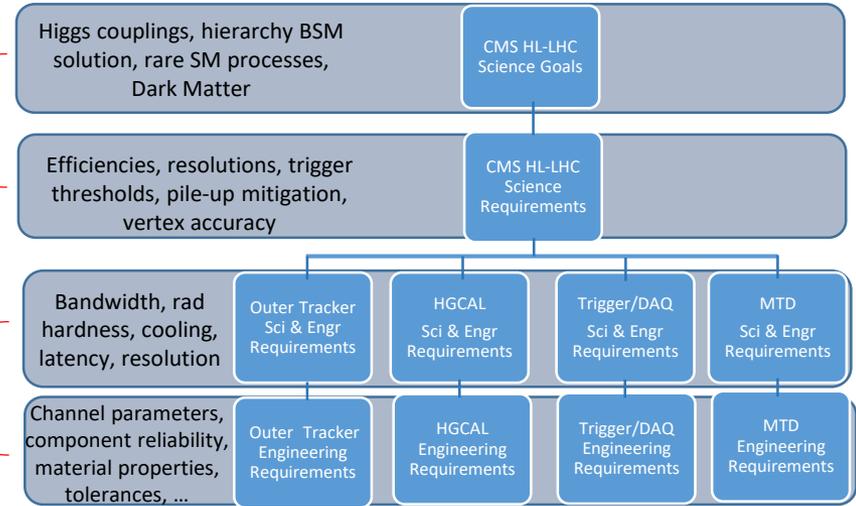
HL-LHC (Phase-2) U.S. CMS Detector Upgrade Project Organization



- QA procedures for each CMS subdetector established by relevant CMS System Upgrade Coordinators (SUCs)
- Corresponding U.S. CMS subproject L2 Manager (e.g. 402.X) responsible for implementation, documentation, etc. within U.S. project to satisfy **both** CMS scrutiny **and** U.S. Project/DOE requisites
- This is facilitated by the fact that in many cases one of the CMS subdetector SUCs or Deputy SUCs is a member of U.S. CMS (see underlined)
 - Sometimes this is the **same person** as the U.S. CMS L2 Manager (e.g. C. Jessop for Barrel Calorimeter and J. Berryhill for Trigger/DAQ) ★

- We have formalized the science flow-down to technical requirements.
- We document the requirements as:
 - Science Goals and Science requirements in one spreadsheet with two tabs:
 - [CMS-doc-13337](#)
 - Under Project Scientist control
 - Sci-Engr and Engineering requirements in one spreadsheet per L2 area with two tabs:
 - [CMS-doc-13388](#), [CMS-doc-13447](#), [CMS-doc-13318](#), [CMS-doc-13536](#)
 - Under L2 Manager(s) control and with system engineering oversight

The flow-down to requirements



CMS Document 13536-v15

MIP Timing Layer HL-LHC Systems Engineering

Document #: CMS-doc-13536-v15
Document type: Technical Data
Submitted by: Jeffrey Dolph
Updated by: Christopher Neu
Document Created: 08 May 2018, 19:10
Contents Revised: 08 Oct 2019, 21:01
Metadata Revised: 08 Oct 2019, 21:01

Update Document
 Update Metadata
 Add Files
 Create Similar
 Watch Document

Abstract:
 Technical Requirements and Interface Control Document for the US CMS HL-LHC MIP Timing Layer Level 2 Project

Files in Document:

- MTDRequirements_8Oct2019.xlsx (39.3 kB)
- MTD_ICD_Rev_8Oct2019_2.docx (102.2 kB)
- MTD_Quality_Activities_8Oct2019.xlsx (87.5 kB)

Get all files as tar.gz, zip.

Topics:

- Upgrades:Upgrades - Phase 2

Authors:

- Jeffrey Dolph
- Christopher Neu
- TJ Sarlina

Related Documents:

- CMS-doc-13337: Science Requirements for US CMS HL-LHC
- CMS-doc-13093: Quality Assurance Plan for the US HL-LHC CMS Project (Approved - 08 Oct 2019)

Viewable by:

- USCMS-MGMT
- USCMS-UP-REVIEWS
- USCMS-UP-TEAM
- USCMS-UP-PHASE2

Modifiable by:

- USCMS-MGMT
- USCMS-UP-TEAM
- USCMS-UP-PHASE2

Quick Links:
 Latest Version

Other Versions:

- CMS-doc-13536-v14 08 Oct 2019, 18:44
- CMS-doc-13536-v13 04 Oct 2019, 19:13
- CMS-doc-13536-v12 02 Oct 2019, 04:57
- CMS-doc-13536-v11 05 Aug 2019, 17:34



Sample Requirements Documentation

Charge #2

US HL-LHC CMS requirements spreadsheets

Science Goals (1 of 4)

[CMS-doc-13337](#)

Title	ID	Type	Experimental Goal	Rationale
Higgs Coupling Measurements	sci-goal-1	experimental objective	HL-LHC CMS is to achieve few percent measurements of the Higgs couplings and constraints on the its invisible width.	This is a HEP wide goal that follows from 1 of 5 P5 science drivers listed in the 2014 P5 report , namely to "use the Higgs boson as a new tool for discovery."

Science Requirements (1 of 14)

[CMS-doc-13337](#)

Title	ID	Type	Requirement	Parents
Primary Vertex Identification (and purity)	sci-req-7	requirement	Accurate reconstruction of Higgs decays requires accurate primary vertex identification (H to $\gamma\gamma$). Accurate reconstruction is also necessary for DM candidates, rare SM processes, or BSM signals.	sci-goal-1, sci-goal-2, sci-goal-3, sci-goal-4

MTD Science-Engineering Requirements (1 of 7)

[CMS-doc-13536](#)

Title	ID	Type	Requirement	Rationale	Parents
MIP timing	MTD-sci-engr-01	requirement	The MTD shall provide time-of-arrival information for minimum ionizing particles (MIP) with resolution of <60ps while accumulating up to 3000/fb in nominal fluence, sufficient to disambiguate spatially-coincident vertices	Improve the particle-flow performance at high pileup (PU) to a level comparable to the Phase-1 CMS detector. Extend the CMS physics reach in a broad class of new physics searches with long-lived particles	sci-req-7, sci-req-8,sci-req-9,sci-req-10,sci-req-11,sci-req-12,sci-req-13,sci-req-14

MTD Engineering Requirements (1 of 37)

[CMS-doc-13536](#)

Title	ID	Type	Requirement Text	Rationale/Notes	Parents
ETROC timing precision	MTD-engr-025	requirement	The ETROC shall measure time-of-arrival of charged particles with a precision of < 50 ps throughout the lifetime of the experiment	The combined measurement of two-hits per charged particle track will provide $\sqrt{2}$ improved measurement per track	MTD-sci-engr-01



Programmatic Requirements

Charge #2

- Not all engineering requirements flow from science goals, some are “programmatic”
- ES&H requirements are of this type
 - These are contained in the same L2 spreadsheets as those that flow from science, but do not have parents.
 - Example excerpts from Outer Tracker ([CMS-doc-13388](#)) below:

ID	Title	Type	Requirement Text	Rationale/Notes	Parents
OT-engr-004	Outer Tracker System ES&H Personnel Injury and Equipment Damage	requirement	Component and tooling internal loads shall not exceed material allowables plus a factor of safety.	Factors of Safety may be facility dependent, early agreement must be made. Analyses and tests must be made to the worst case.	N/A, programmatic requirement
OT-engr-005	Outer Tracker System ES&H Electrical Hazards	requirement	All Project activities shall comply with international and US Electrical standards and regulations.	Following complete planning and engineering and PRIOR to commencing work on fabrication and/or test operation all systems components and the supporting documentation/data must be reviewed and compliance validated.	N/A, programmatic requirement
OT-engr-006	Outer Tracker System ES&H Mechanical Fluid Cooling Systems Hazards	requirement	All Project activities associated with mechanical fluid cooling systems shall comply with international and US ES&H standards and regulation.	Following complete planning and engineering and PRIOR to commencing work on fabrication and/or test operation all systems components and the supporting documentation/data must be reviewed and compliance validated.	N/A, programmatic requirement
OT-engr-023	Outer Tracker System Logistics - Transport	specification	Component packaging shall be sufficient to prevent component damage during all forms of transport.	Verification of this requirement need not exceed engineering judgment except in cases specifically identified by the Lead Systems Engineer.	N/A, programmatic requirement



Documentation of External Interfaces

Charge #2

[CMS-doc-13447](#)



INTERFACE CONTROL DOCUMENT

CMS HL-LHC DocDB Project Document No. CMS-doc-13447	
Endcap System ICD	
Page 1 of 13	
Revision: 10142019	Date: 14-Oct-2019

Endcap (WBS 402.04) System Interface Control Document

NOTE:

The most recent DocDB version of this document is the ONLY controlled record of this document.

Refer to [CMS-doc-13447](#)

This document is only to be revised by the Endcap (WBS 402.04) Manager or Systems Engineer

Abstract

This document lists the external interfaces for the Endcap (WBS 402.04) System that is part of the scope for the USCMS HL-LHC Upgrade Project and provides information for interface coordination with other US Project WBS Level 2 Systems, other CMS HL-LHC Upgrade systems, other CMS Systems not upgraded for the HL-LHC, and all facilities external to this Endcap (WBS 402.04) System. This document is expected to contain hyperlinks to the latest revision of configuration managed documents/data that must be revised if the interface changes. The Endcap (WBS 402.04) Manager, Endcap Level 3 subsystem Managers, and Endcap Systems Engineer(s) are advised to set automatic notification of change to hyperlinked doc/data to facilitate timely reaction to changes to the other side of their interfaces.

Prepared by:

J. Mans
H. Cheung
L2 Systems Manager(s)

Checked by:

J. Dolph
Lead Systems Engineer

Approved by:

J. Mans
H. Cheung
Level 2 System Manager(s)

Revision status recorded in:

CMS-doc-13447

1. Table 1 – Endcap (WBS 402.04) External Interfaces (no Level 3 equivalent)

Item	Interface Name	Interface Description	External-facing doc/data link	Project-side doc/data Owner	iCMS doc/data Owner	Stable (Y/N)	Interfacing doc/data link
1.01	High Voltage	CE-H System total required from CERN	To be added	Roger Rusack		N	To be added
1.02	Low Voltage	CE-H System total required from CERN	To be added	Roger Rusack		N	To be added
1.03	Radiation	Operational HL-LHC CMS radiation levels to be experienced by CE-H System.	CERN EDMS Doc# 2144447 [16]	Jim Strait	CERN: Philippe Bloch	Y	CERN EDMS Doc# 2144447 [16]
1.04	System Dimensional Envelopes	In-situ for CMS HL-LHC operation mechanical and electrical interface parameters	CERN EDMS Doc# 1895113	Jim Strait	CERN: Austin Ball	Y	CERN EDMS Doc# 1895113
1.05	Installation Dimensional Envelopes	Access conditions, imposed ES&H requirements and other parameters of mechanical and electrical interface for CE-H transport and installation into CMS.	To be added	Jim Strait	CERN: Philippe Bloch	N	edms.cern.ch
1.06	Patch Panels	Connections extra CE-H, intra CMS for power, cooling, readout & control fibers. Under Endcap control	CERN EDMS Doc# 2187146	Jim Strait	CERN: Thomas French	N	CERN EDMS Doc# 2187146
1.07	Endcap Calorimeter Bulkhead	Environmental seal and mechanical boundary	CERN EDMS Doc# 2187153	Jim Strait	CERN: Thomas French	N	CERN EDMS Doc# 2187153

8. Table 8 – Endcap ECON ASIC External Interfaces

Item	Interface Name	Interface Description	External-facing doc/data link	Project-side doc/data Owner	iCMS doc/data Owner	Stable (Y/N)	Interfacing doc/data link
8.01	HGCROC connection	Data formats and signal specifications from HGCROC that is the input to the ECON	To be added	Jim Hirschauer	Christophe de La Taille	N	To be added
8.02	CE-E Motherboard	Constraints on the ECON from the CE-E Motherboards	To be added	Jim Hirschauer	Paul Aspelt	N	To be added
8.03	Backend Data	Data formats and signal specifications to Backend DAQ	CERN EDMS Doc# 2220310	Jim Hirschauer	Paul Dauncey	N	CERN EDMS Doc# 2220310
8.04	Trigger	Trigger format, and signal and latency specifications	CERN EDMS Doc# 2220310	Jim Hirschauer	Paul Dauncey	N	CERN EDMS Doc# 2220310
8.05	Controls	Control formats, and timing specifications	To be added	Jim Hirschauer	Paul Dauncey	N	To be added



External Interfaces and P6

Charge #2

- Interfaces are included in the P6 schedule using constrained milestones whose dates correspond to the expected external dates. They are monitored and updated regularly.
 - External things that are needed by Project (e.g. funding, iCMS chips) - predecessors to subsequent Project work.
 - Deliverables of the Project that are subsequently needed by iCMS – successors to the Project work that produces the deliverable.
 - The Project maintains schedule contingency before the iCMS “need by” milestones
- The external milestones are identified by the P6 Milestone Tier field as follows:
 - **E1** – External – Calendar e.g. “Start of FY20 Q1”
 - **E2** – External – DOE e.g. “DOE – CD-2 Approve Performance Baseline”
 - **E3** – External – NSF Not applicable to DOE scope
 - **E4** – External – Accelerator e.g. “LHC – Start Long Shutdown 3”
 - **E5** – External – Experiment e.g. “OT sensor contract placed by CERN”



Responses to Review Recommendations

Charge #8

- See [CMS-doc-13604](#), Review Recommendations Tracking Document, which includes:
 - Answers to recommendations, comments, findings from the June 2018 IPR
 - Answers to recommendations from the November 2018 ESH&Q Review
 - Answers to recommendations from the November 2018 MTD Technical Review
 - Answers to recommendations and actionable comments from the March 2019 pre-CD-1 Director's Review.



Responses to the June 2018 IPR

Charge #8

- Tracked items: 60 (20 Recommendations, 34 comments, 6 findings)
- CD-1 related items: 31 – all closed

Status	Recommendations		Comments			Findings	
	Closed	Open	Closed	Open	On-going	Closed	Open
CD							
CD-1	14		14			3	
CD-3a			3				
CD-2	5	1	12	3		3	
CD-4			1		1		

- 24 additional items closed. One recommendation – automation of OT module construction – and three comments, remaining to be closed by CD-2. One comment is on-going.



Responses to the June 2018 IPR

Management Recommendations

Charge #8

- #20 Project Management should work closely with U.S. CMS on a strategy to successfully complete MTD scope with minimal impact to the project. Successful completion of an external review of the MTD conceptual design is required prior to CD-1 approval.
 - Technical Review of the CDR for MTD was held November 15/16, 2018. The final report ([CMS-doc-13698](#)) confirmed that “tremendous progress has occurred over the last 6 months and that the MTD is now at or beyond a “CD-1” level of maturity.
 - Successfully met in December 2018 the MTD related FY19 PEMP Notable Objective, that required to have a viable plan for the inclusion of MTD in the HL-LHC CMS project by December 2018. (Acknowledgement by M. Procaro on Dec. 4, 2018).
 - MTD TDR fully approved by CERN Research Board on September 18, 2019



Responses to the June 2018 IPR

Management Recommendations

Charge #8

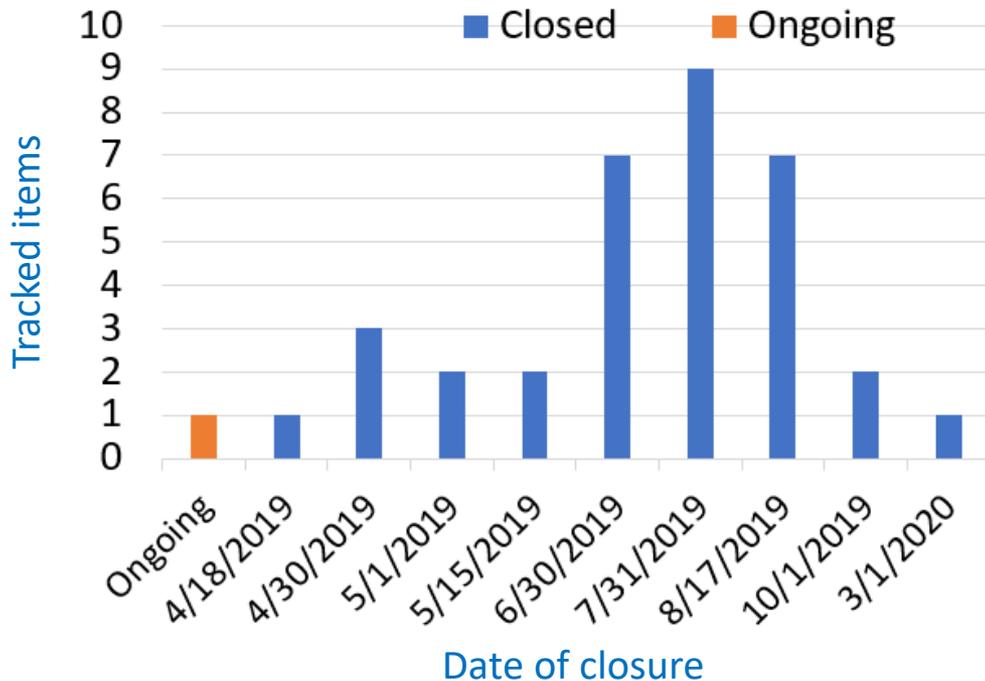
- #21 Project Management should proactively engage in identifying qualified candidates to fill key project positions, in advance of impending changes.
 - Added more Deputies to the L2 areas to ensure smooth transfer of responsibilities. Have replaced OT Deputy, added two Trigger/DAQ Deputies and filled in MTD management structure. We consult widely within the collaboration and the laboratory in order to make these appointments. Meet at least bi-weekly with the leadership of each individual L2 subproject to keep abreast of any impending changes.
- #22, #23 addressed within Management B02 and #24 addressed within Management B04.



Responses to the March 2019 DR

Charge #8

- Received 18 Recommendations, 4 of which were to “proceed to the CD-1 IPR”
- Tracked items: 35 (14 Recommendations, 21 comments)
- All were CD-1 related. 34 closed, and one comment – EDMS related – ongoing.





Responses to the March 2019 DR

Management Recommendations

Charge #8

- #13 Before CD-1 IPR, scrub the costs and in particular the labor estimates.
 - We have done significant cost scrubbing of each L2 area to re-estimate both Labor and M&S costs. In most cases the BAC for the L2 areas increased by a few percent since the Director's Review, consistent with nominal progression towards a baseline. In MTD, which was introduced into the project late, and thus had to fit a particular cost, we have been able to alleviate this constraint by finding savings elsewhere, thus its BAC has increased by about 10%.



Responses to the March 2019 DR

Management Recommendations

Charge #8

- #14 Before CD-1 IPR, adjust the detector deliverable components, excluding I&C, to fit within the 151M\$ envelope with a greater margin.
 - Since the Director's Review, we have rebalanced the fraction of scope between Threshold and Objective KPPs, excluding I&C, adding \$5.1M in Objective scope involving every L2 area. This Scope Contingency, combined with Estimate Uncertainty and Risk, currently amounts to 40.2% on the Cost to Go (including the I&C) which we believe is sufficient for this stage of the project.



Responses to the March 2019 DR

Management Recommendations

Charge #8

- #15 Before CD-1 IPR, reassess the number and definition of the KPPs and move threshold KPP scope to objective KPP scope to generate scope contingency.
 - KPPs vetted by L2s and Project Office and Docdb 13237 updated. Number of KPPs reduced from 7 to 4. Updates discussed with IPT in the process and presented officially on May 30th, 2019.
 - We have also identified \$5.1M of scope contingency in addition to I&C.
- #16 Before CD-1 IPR, prepare the plan to get ready for CD-2
 - We have incorporated both managerial and technical steps to achieve CD-2 in P6.



Responses to the March 2019 DR

Management Recommendations

Charge #8

- #17 Before CD-1 IPR, develop a plan to combine the CD-3a and CD-3b reviews.
 - The scope of CD-3a has been adjusted, and this allowed us to plan for a CD-3a review in March 2020 for a few long lead procurements, mostly Silicon sensors, and then a CD-3 combined with the CD-2 review in Fall 2020.



HL-LHC Procurement Management Plan

Charge #7

[CMS-doc-13267](#)

- Updated and approved both in March 2019, and in October 2019.
 - The Plan describes processes and methods to acquire goods and services to support the HL-LHC CMS Project
 - At a strategic level the plan addresses subcontract administration, procurement risk management, advance planning and scheduling and incorporation of ES&H and Quality Assurance into procurement activities
 - Recent updates to the Procurement Management Plan include implementation of a Procurement Review Board (final procurement gating process for major procurements) as well as updated Procurement Cycle Times.



HL-LHC CMS Procurements

Charge #4

Charge #5

- A Procurement Liaison has been assigned to the Project with whom we have weekly meetings.
- Procurement has received 52, HL-LHC CMS Upgrade requisitions between October 30, 2018 to September 11, 2019. Of those, 48 were for Universities and 4 for companies.
- These created 66 subcontracts, out of which 63 have been already awarded.
- Average process time from requisition approval to subcontract award is 36 workdays.



HL-LHC CMS Critical Procurements

Charge #4

[CMS-doc-13750](#)

- All procurements over \$1M
- Procurement actions that require complex evaluation systems
- Procurements with high technical, cost, and schedule risk

Subsystem	Material	Obligate date	Contingen cy (k\$)	Estimated Cost (k\$)	Total Cost (k\$)	Foreign / Domestic	Cern Central Purchase	CD-3A/B
402.8 MTD	ETL - ASICS (preproduction)	12/1/2021	123	816	939	Foreign	Not Known	CD-3
402.8 MTD	ETL - ASICS (production)	8/1/2022	152	1,014	1,166	Foreign	Not Known	CD-3
402.4 EC	EC - Silicon module PCBs	6/1/2021	431	1,437	1,868	Domestic	No	CD-3
402.4 EC	EC - Silicon motherboard PCBs	6/1/2021	625	1,250	1,875	Domestic	No	CD-3
402.6 TD	TD - Correlator Boards	8/1/2022	388	1,292	1,680	Domestic	No	CD-3
402.4 EC	CE - ECON Production	5/1/2021	396	1,321	1,717	Foreign	No	
402.6 TD	TD - Calorimeter Boards	8/1/2022	367	1,223	1,590	Domestic	No	CD-3
402.2 OT	OT - MAPSA Bump Bonding	3/1/2020	581	1,935	2,515	Foreign	No	CD-3
402.2 OT	OT - Al. Carbon-Fiber Spacers	2/5/2020	1,018	2,298	3,316	Domestic	No	
402.8 MTD	BTL - Procure Production SiPMs	10/1/2020	265	1,765	2,030	Foreign	No	CD-3
402.4 EC	EC - LV Supply	5/1/2022	192	641	833	Foreign	Yes	CD-3
402.8 MTD	BTL - Procure Production LYSO	8/1/2020	157	523	680	Foreign	Not Known	CD-3a
402.4 EC	EC - Odd-sized sensors	10/1/2020	315	1,051	1,366	Foreign	Yes	CD-3a
402.4 EC	EC - HV Supply	4/1/2023	277	925	1,202	Foreign	Yes	CD-3
402.4 EC	CE - SiPMs	5/1/2020	239	797	1,036	Foreign	Yes	CD-3
402.6 TD	TD - DAQ Storage Manager	1/2/2025	421	843	1,264	Foreign	Yes	CD-3
402.2 OT	OT - 2S Hybrids	7/21/2021	378	1,261	1,640	Foreign	Yes	CD-3
402.2 OT	OT - PS Hybrids	7/21/2021	552	1,841	2,393	Foreign	Yes	CD-3
402.4 EC	EC - Production sensors	10/1/2020	1,530	7,126	8,657	Foreign	Yes	CD-3a
402.2 OT	OT - production sensors	5/15/2020	794	3,968	4,761	Foreign	Yes	CD-3a



Planning for Si Sensor Procurements

Charge #4

Charge #5

- Acquisition Plans (APs) are in process for Silicon sensors to be bought through CERN for the Outer Tracker and Endcap Calorimeter.
 - Project Office is working collaboratively with FRA Leadership, Fermilab Procurement and Office of General Counsel and with CERN colleagues.
 - An MOU between FNAL and CERN is required, which covers both procurement packages and is currently in the review process.
- Established the timeline for preparation & execution of the two procurement packages
 - Outer Tracker procurement process is well advanced. Endcap Calorimeter will follow, taking advantage of the gained experience.
 - Although the expected award for the Outer Tracker is close to but < \$5M, an Acquisition Plan was written and has been reviewed by the DOE Fermilab Site Office (FSO). We submitted answers to FSO questions past week.
 - The Request for Proposal is expected to be submitted to CERN between December 2019 and January 2020 with an award expected between March and May 2020, consistent with expected CD-3a approval.



Summary

- Requirement and Interface documents are in place, and at the appropriate level for this stage of the Project.
- Good collaboration with Procurement Department and good progress with both regular as well as complex/critical procurements.
- Have addressed all Management related Review recommendations.
- We are ready to proceed to CD-1.



Backup

Additional Slides



Documentation of External Interfaces

Charge #2



CMS HL-LHC DocDB Project Document No. CMS-doc-13318	
Trigger and DAQ System ICD	
Page 1 of 9	
Revision: C	Date: 07-Oct-2019

INTERFACE CONTROL DOCUMENT

<p>Trigger and DAQ (WBS 402.06 and 402.09) System Interface Control Document</p>		
<p>NOTE: The most recent DocDB version of this document is the ONLY controlled record of this document. Refer to CMS-doc-13318 This document is only to be revised by the Trigger and DAQ (WBS 402.09) Manager or Systems Engineer</p>		
<p>Abstract This document lists the external interfaces for the Trigger and DAQ (WBS 402.09) System that is part of the scope for the USCMS HL-LHC Upgrade Project and provides information for interface coordination with other US Project WBS Level 2 Systems, other CMS HL-LHC Upgrade systems, other CMS Systems not upgraded for the HL-LHC, and all facilities external to this Trigger and DAQ (WBS 402.09) System. This document is expected to contain hyperlinks to the latest revision of configuration managed documents/data that must be revised if the interface changes. The Trigger and DAQ (WBS 402.09) Manager, Trigger and DAQ Level 3 subsystem Managers, and Trigger and DAQ Systems Engineer(s) are advised to set automatic notification of change to hyperlinked doc/data to facilitate timely reaction to changes to the other side of their interfaces.</p>		
<p>Prepared by: Richard Cavanaugh L2 Systems Engineer(s)</p>	<p>Checked by: J. Dolph Lead Systems Engineer</p>	<p>Approved by: J. Berryhill K. Ulmer L2 Manager(s)</p>
<p>Revision status recorded in: CMS-doc-13318</p>		

CMS-doc-13318

3. Table 4 – DOE Scope: Correlator Trigger Layer-1 (WBS 402.06.05) External Interfaces

Item	Interface Name	Interface Description	External Facing doc/data Owner	External Facing doc/data Link	Static (Y/N)	Interfacing doc/data link	Interfacing doc/data Owner
4.01	ATCA standard	The CTL1 board must conform to the ATCA specification Trig-engr-005 Trig-engr-069 Trig-engr-071 Trig-engr-072 Trig-engr-073	Tom Gorski (Wisconsin)	(APT board specs doc, CMS DocDb Ref # 13318)	Y	ATCA Spec: CMS-EB-ES-0094	CERN CMS lead engineer Magnus Hansen
4.02	CTL1 TP	The CTL1 board must receive trigger primitive information from the TFT, GMT, BCT, and CEBE boards per requirements Trig-engr-060 Trig-engr-061 Trig-engr-063 Trig-engr-077	Tom Gorski (Wisconsin)	(APT board specs doc, CMS DocDb Ref # 13318)	Y	CMS DocDb Ref # 13318	CERN CMS lead Upgrade Coordinator (Frank Hartman)
4.03	CTL2 and GT	The CTL1 board must transmit information to the CTL2 and GT per requirements Trig-engr-079 Trig-engr-080 Trig-engr-082 Trig-engr-102 Trig-engr-103 Trig-engr-104	Tom Gorski (Wisconsin)	(APT board specs doc, CMS DocDb Ref # 13318)	Y	CMS DocDb Ref # 13318	CERN CMS Trigger Project Manager (Alex Tapper)
4.04	DAQ	The CTL1 board must transmit/receive information to the DAQ per requirements Trig-engr-083 Trig-engr-098	Tom Gorski (Wisconsin)	(APT board specs doc, CMS DocDb Ref # 13318)	Y	CMS DocDb Ref # 13318	CERN CMS DAQ leader (Frans Meijers)